

## ABSTRACTS OF PAPERS PRESENTED AT THE SPRING 1988 COLLEGIATE MEETING

### EASTERN REGION CARSON NEWMAN COLLEGE

*Current Treatments of Osteoporosis.* Brenda G. Gilbert, Lee College. Osteoporosis is perhaps the most common skeletal bone disorder seen in the medical practice today. This disease is considered to be responsible for fractures in the wrist, hip and vertebral column. It is classified into two types. Type one osteoporosis occurs with or during menopause and occurs only in women. Type two osteoporosis is often termed senile due to the association with a loss of bone from natural aging processes. At the present time, areas of treatments are limited. Calcitonin and sodium fluoride can be given to increase bone mass, but must be carefully monitored due to serious side effects. Prevention is the key to combating osteoporosis. Prevention must include changes in the lifestyle, diet and exercise programs. Calcium supplements may be given and dietary changes are suggested. Prevention must also include adequate treatment by eliminating risk factors, and adding estrogen therapy for high-risk patients.

*Dicyclohexylcarbodiimide as a Reagent in the Formation of Carboxylic Acid Anhydrides, II.* Clark Kent and I.T. Glover, Roane State Community College. The tertiary amine, 4-pyrrolidinopyridine (4-PP), catalyzes esterification reactions which employ DCC as a dehydrating agent. The reaction of benzoic acid with DCC to form benzoic acid anhydride, however, was inhibited by 4-PP. Kinetic studies indicated that the inhibition was due to salt formation between the acid and the amine, but provide no inference concerning the role of 4-PP as a catalyst in esterification reactions.

*The Nature of Ionic Pollution of Surface Waters of Abandoned Strip Coal Mines.* Kristin Ling, The University of Tennessee at Chattanooga. The nature of ionic pollution present in the surface waters of an approximately 1.5 hectare watershed located within the carbon strip coal mine on Sand Mountain in Dade County, Georgia was investigated. Strip mining on the site was ended in 1977, with partial reclamation completed in 1978. Nineteen samples of mining debris were analyzed by atomic emission and atomic absorption spectroscopy in order to determine the potential ionic pollution available from the mining debris. Concentrations of iron, sodium, magnesium, manganese, potassium, aluminum, calcium, chromium, copper, lead, nickel, and zinc

were found to be present in the debris. Mineralogic analysis showed the predominate mineral constituents to be quartz, illite, kaolinite, and muscovite clays. Surface water samples were collected on four dates in January and February of 1988 and analyzed using the Hach Drel/5 kit. Runoff samples from the mining spoils and from the highwall were collected in addition to samples from a pond located in the pit left by the mining process. The waters were found to be low in alkalinity and acidity and to contain high concentrations of iron. High manganese concentrations were found to be present in the pond. In addition, high concentrations of sulfate and hardness were detected in the spoils runoff. These conditions are indicative of the occurrence of acid mine drainage in the watershed.

*Developmental Vision.* Thomas D. Robertson, Lee College. It has been said that vision is the dominant factor in human development. Approximately 80 percent of all learning is in direct response to some visual stimulus. Acuity is the ability to see things clearly, and most people feel this is the only problem that can be visually associated. This leads to problems. Sight has been defined as the ability to see; however, vision means much more. Vision is the ability to understand what one sees. Vision is a learned process, that must often-times be stimulated in order to develop proper coordination and understanding techniques. The functional optometrist plays a key role in the developmental approach to vision; therefore, a look at the functional optometrist, and the doctrines and models used by the discipline, are discussed. The remainder of this investigation into developmental vision concentrates on the physical and physiological structures of the eye development, and the association between the development of learning to see and the above mentioned functions.

*Dicyclohexylcarbodiimide as a Reagent in the Formation of Carboxylic Acid Anhydrides, I.* Robin Whittaker and I. T. Glover, Roane State Community College. Dicyclohexylcarbodiimide (DCC) is a widely used reagent for the synthesis of peptides, esters, and anhydrides. The kinetics of anhydride formation from carboxylic acids with DCC was studied by spectrophotometry at 267 nm. Specific reaction rate constants were determined for second order and third order rate expressions and indicate that the reaction is second order overall, first order in acid and first order in DCC.

*Geology of Sassafras Ridge.* Allen Young, The University of Tennessee at Chattanooga. Great Smoky Group metasedimentary rocks form the ridges in the Unaka Mountains of

Tennessee. One of the trans-Unaka Mountain roads, Tennessee Scenic Highway 165E, exposes rocks atop the Sassafras Ridge in Monroe County, Tennessee. The road cut indicates that despite the intermediate grade Paleozoic metamorphism to which the rocks were subjected, synsedimentary structures of precambrian age are very well preserved. Large-scale scours, up to 10 meters thick, are infilled by medium to coarse-grained, internally normal size-graded or otherwise massive metalitharenites. Beneath a stack of such metalitharenites, the rocks consist of alternating metalitharenite and slate. All of these are interpreted to be deep sea turbidites. An interesting feature is that the coarser-grained litharenites are injected by thin, mutually parallel, northeast trending, high angle dikes and veinlets of quartz and rarely of mafic minerals. The mafic dikelets have well-defined contact aureoles.

## MIDDLE REGION

### AUSTIN PEAY STATE UNIVERSITY

*Reaction of p-Aminoacetophenone with Lithium Methoxide.* Keisa Birdwell and Dr. James H. Hutchinson, Middle Tennessee State University. p-Aminoacetophenone was allowed to react with acetic anhydride to yield p-acetaminophenone (I). Calcium hypochlorite was used to chlorinate (I) to yield 4-acetamino-3-chloroacetophenone (II). Bromine was then added to (II) to produce 4-acetamino-3-chlorophenacyl bromide (III). The reaction of (III) with lithium methoxide did not yield the desired 4-oxo-2,3-epoxy-2,4-bis (4-acetamino-3-chlorophenyl)-1-bromobutane but instead 4-acetamino-3-chlorophenyl methyl ether was formed. Acid hydrolysis of (III) yielded 4-amino-3-chlorophenacyl bromide. The p-aminoacetophenone was treated with phthaloyl chloride to form p-phthaloylaminoacetophenone (IV). Compound (IV) was then chlorinated by the use of calcium hypochlorite to yield 3-chloro-4-phthaloylaminoacetophenone (V). Bromination of (V) gave rise to 3-chloro-4-phthaloylamino-phenacyl bromide.

*The Effects of Clotrimazole on Growth Rate of Acanthamoeba Castellanii (T87).* Kim Clifford, Joe Cornelius and Gus Tomlinson, Tennessee State University. *Acanthamoeba Castellanii* (T87) were grown in a proteose peptone-glucose medium at 30°C to a cell density of  $5.6 \times 10^5$ /ml. Log phase cells were inoculated into fresh growth medium at  $10^4$  cells/ml after which sterile clotrimazole was added aseptically. Cell counts were made using a hemocytometer and phase contrast microscope on alternate days for a total of seven days. Results were recorded in terms of percentage growth relative to original inoculum. Controls which received sterile saline grew rapidly reaching a 7-day count which was 350% of inoculum while concentrations of clotrimazole as low as 5 µg/ml reduced cell division to the degree that an increase of only 33% over inoculum occurred during the entire seven day period of the experiment. Since clotri-

mazole as the major active ingredient of the commercial antifungal agent, Mycosporin, produces no short or long-term side effects in humans, this chemical is a good candidate for a safe and effective treatment of *Acanthamoeba keratitis* and possibly other human conditions known to be associated with this organism. This work was supported by funds from NSF Grant RII-8704133 and NIH Grant SO6RR08092.

*The Organization of Temperament in Twelve-Month-Old Infants.* Michelle Crain, Patricia Chappell, Julie Moore, Terry Edwards, and Alicia Birch, Austin Peay State University. The various theories concerning the nature of infant temperament were discussed, and the results from a study of separation and reunion behaviors of infants were presented. Twenty-six twelve-month-old infants and their caregivers were subjects of the study; infants varied in their daycare experience. Maternal report of infant temperament was assessed with Rothbart's Infant Behavior Questionnaire (IBQ) which identifies six dimensions of temperament. The scores on the six dimensions of temperament failed to account for a significant proportion of the variance in the responses of the infants to separation from the caregiver and their subsequent reunion. The raw scores from the IBQ items were reduced by factor analysis to four factors which were labeled positive reactivity, negative reactivity, orienting, and activity. These factors accounted for 90% of the variance in the temperament scores. These results were similar to Rothbart's findings in a 1986 study. Infants who had been cared for at home since birth showed greater intensity of distress to separations. In this respect, full-time home care contributed to the high correlations present in the negative reactivity factor. This suggests that maternal negativity in the home may influence the higher distress scores in home-care babies, thus challenging a purely biological model of temperament.

*In Vitro Selection of Soybean Cell Lines.* Angela Howard (Undergraduate Biological Sciences) and Dr. E.L. Myles (CARP Program). Water deficits, salinity and temperature fluctuations are among the most important environmental factors that limit crop production. It is estimated that drought and excess salts affect approximately 25% of the world's arable land. The usual answer to problems of drought has been irrigation. However, increased irrigation increases salinity, which is detrimental to crop production. The objective of our project was to evaluate soybean germplasm for salt tolerance and to increase tolerance through selection by *in vitro* techniques. The soybean cultivars evaluated in this study were Hill, Pickett and Columbus. All of these cultivars were obtained from the experimental plots at Tennessee State University. Mature seeds were surface sterilized and placed on an Agar medium for two weeks. Hypocotyls and cotyledons were excised and cut into 2mm sections. These sections or explants were placed on medium supplemented

with 2 mg/L 2, 4-dichlorophenoxy acetic acid (2, 4-D) for three weeks. The callus growth from the explants were transferred to suspension cultures in liquid medium supplement with 2 mg/L 2, 4-D. The cells were placed in culture medium containing various concentrations of salt. The pack cell volume, dry and wet weight of these cells was used to estimate growth rate. Through successive transfers to higher salt concentrations, we were able to increase the salt tolerance in the cell lines as compared to parent lines. These results suggest that the NaCl concentrations acted as a selection pressure that favored the growth of tolerance cell lines over the susceptible lines. (Supported by CSRS grant 8503-7-PS19.)

*Reduction of Selected Aromatic Nitro Compounds.* Douglas Mullendore and Dr. James H. Hutchinson, Middle Tennessee State University. Reactions involving the reduction N-tert-butyl-N-[4-oxo-2,3-epoxy-2,4-bis(p-nitrophenyl)]-1-butanamine to N-tert-butyl-N-[4-oxo-2,3-epoxy-2,4-bis(p-aminophenyl)]-1-butanamine, using sodium polysulfide as the reducing agent, were explored. The reduction of p-nitroacetophenone, using sodium polysulfide, was achieved yielding 1-(p-amino-phenyl)-1-ethanol. The preparation and reduction of p-nitrophenacyl bromide was also carried out. However, the bromine in the reduced compound was replaced by sulfur during the reduction. The preparation of 4-oxo-2,3-epoxy-2,4-bis(p-nitrophenyl)-1-bromobutane was accomplished by the reaction of p-nitrophenacyl bromide with a freshly prepared solution of lithium methoxide. To prevent the replacement of bromine by sulfur, before reducing with sodium polysulfide, the bromobutane was reacted with t-butyl amine forming N-tert-butyl-N-[4-oxo-2,3-epoxy-2,4-bis(p-nitrophenyl)]-1-butanamine.

*The Relationship Between Early Daycare Experience and the Response to Separation from Caregivers in Twelve-Months-Old Infants.* Julie Moore, Patricia Chappell, Michelle Crain, Terry Edwards, Alicia Birch; Austin Peay State University. Twenty-six infants (13 males and 13 females) twelve-months of age ( $\pm 2$  weeks) were observed in a laboratory setting during assessment of developmental status with the Bayley Scales of Infant Development. Twice during the assessment procedures, caregivers left the room and returned in two minutes unless uninterrupted crying occurred. Responses of infants to separation and reunion were analyzed according to daycare experience of the infant. Infants with early entry into fulltime daycare ( $>20$  hours/wk) showed significantly lower responses to Separation 1 than either the part-time daycare infants ( $<20$  hours/wk) or the fulltime homecare infants; fulltime daycare infants also showed lower responses to Reunion 1 than the fulltime homecare infants but no lower than the part-time daycare infants. No differences were found on the second separation or reunion which were each responded to with significantly

more intensity in all infants. Neither developmental status scores nor maternal ratings of temperament of the infant on the Infant Behavior Questionnaire accounted for a significant proportion of the variance in infant responses to separation and reunion. It is not clear from this study, nor from others, whether the lower responses of daycare infants to separation and reunion results from avoidant-insecure attachments with caregivers or from independence training through daily separations from caregivers over most of the first year of life. Further research in this area is recommended.

*Encoding Strategies and the Recognition of Own and Other Race Faces.* Timothy L. Russell and James Hird, supervised by Dr. L.W. Giesbrecht-Bettoli, Tennessee Technological University. The purpose of this study was to investigate the effects of the elaboration hypothesis on the recognition of same race as well as opposite race faces. The elaboration hypothesis states that inferences about personality traits improve recognition because they lead to a more extensive scan of the face causing more information to be encoded. An interesting finding in previous research shows that subjects have difficulty recognizing faces of another race compared to faces of their own race. Also the type of encoding procedure for whites affects how well a face is recognized (Winograd, 1981). Generally, subjects who infer personality traits about a face, such as honesty, friendliness, intelligence, etc., recall the faces significantly better than subjects who encode only physical characteristics of the face, such as large nose, long hair, square chin, etc. The present study investigated the relationship between orienting strategies and facial recognition performance. The hypothesis of this experiment was that black subjects encoding personality traits would perform better on the recognition task than either the black subjects using the physical feature encoding technique or the white subjects using either technique. In this experiment, 47 male subjects (23 black, 24 white) were asked to make various decisions about slides of faces and were then given a recognition test. The subjects were randomly assigned to either the physical trait technique or the personality trait technique. In the presentation stage, 80 slides of black and white faces were used with 40 duplicates of critical faces and 40 distractors. There were an equal number of slides from each race. The order of the slides was randomized. In the recognition stage, 100 slides were used with the 40 duplicates of critical faces and 60 distractors. Subjects were asked to answer yes or no to indicate whether they had seen the face before. The scores were then converted to  $d'$  scores, and a three-way analysis of variance was performed. The results of the analysis showed a significant main effect for condition,  $F(1, 43)=6.53, p<.01$ . The personality trait condition yielded higher recognition rates ( $M=1.42$ ) than the physical trait condition ( $M=1.06$ ). There was also a significant main effect for race of face,  $F(1, 43)=17.29, p<.001$ . White faces were recognized at a

significantly higher rate ( $M=1.44$ ) than black faces ( $M=1.04$ ). An interaction was found between the race of subject and the race of the face to be identified,  $F(1,43)=5.09$ ,  $p<.03$ . The results showed that black subjects using the personality trait technique actually performed better on the recognition test than did black subjects using the physical traits technique. White subjects, however, performed slightly better using the personality trait technique than black subjects. It was also found that white subjects recognized white faces significantly better than black subjects recognized black faces while black subjects recognized white faces significantly better than white subjects recognized black faces.

*Calculation of Potential Energy Surfaces for Dinuclear Systems.* Kenneth Selvidge and Dr. Sakir Ayik, Tennessee Technological University. An extension of the diffusion model for describing the intermediate processes (fast fission, quasi-fission and orbiting) and the compound nucleus formation in heavy-ion collisions is proposed<sup>1</sup>. The model describes the intermediate processes and fusion in terms of the formation and the evolution of a long-lived dinuclear molecular complex (DMC) and its subsequent decay by fragmentation. The colliding ions can be trapped into the pocket of the entrance channel nucleus-nucleus potential and a DMC is formed. The DMC acts as a doorway state towards the formation of a completely equilibrated compound nucleus. At each stage of its evolution, there is a finite probability to emit fragments into outgoing channels by thermal penetration over the barrier. The model, at the equilibrium limit, has been successfully applied to analyze the orbiting and fusion data in Si+C collisions<sup>2</sup>. The calculation of the probability to emit fragments is determined by several input values of which the total potential energy of the DMC is one. The potential energy is dependent on three collective variables describing the shape of the DMC. The three variables are: the distance between the centers of the colliding nuclei ( $s$ ), the cross-section of the neck connecting the two nuclei ( $\sigma$ ), and the mass asymmetry ( $\delta$ ). The total potential energy results from the addition of the potential energy due to the strong nuclear force and the Coloumb force as well as intrinsic and orbiting rotation energy. The nuclear and Coloumb potentials are calculated by integration over the entire shape of the DMC. These calculations are made over different combinations of  $s$ ,  $\sigma$  and  $\delta$ , thus allowing for a statistical treatment of the DMC. Several successful calculations have been made for different systems and graphed as a function of  $s$  and  $\sigma$ . Work is still going on to incorporate the potential energy into the diffusion model that describes the DMC.

<sup>1</sup>S. Ayik, et al., submitted for publication in *Physical Review C*.

<sup>2</sup>B. Skivakumare, et al., submitted to *Physical Review Letters* and D. Shapia, et al.

*The Effects of Propamidine Isethionate on Growth Rate of Acanthamoeba Castellanii (T87).* Chelsea Smartt, Marlo Kemp and Gus Tomlinson, Tennessee State University. *Acanthamoeba castellanii* (T87) were grown in a proteose peptone-glucose growth medium at 30°C to a cell density of  $5 \times 10^5$  /ml. Log phase cells were inoculated into fresh growth medium at  $10^4$  cells/ml after which sterile propamidine isethionate was added aseptically. Cell counts were made at the beginning of the experiment and on alternate days through seven days. Concentrations of propamidine isethionate as low as 5 ug/ml were found to stop growth and division of *Acanthamoeba*. The inhibition lasted the entire duration of the experiment (seven days). Controls which received sterile distilled water grew rapidly reaching a cell density of  $6.8 \times 10^5$ /ml over the seven day period of the experiment. Since propamidine isethionate as an atopic or rinsing medicinal agent produces no short or long-term side effects in humans, this chemical is a good candidate for a safe and effective treatment for *Acanthamoeba keratitis* and possibly other human conditions known to be associated with this organism. This work was supported by funds from NSF Grant RII8704133 and NIH Grant S06RR08092.

## WESTERN DIVISION Memphis State University

*Effect of Atomic Structure at the Epitaxial CaF<sub>2</sub>/Si(111) Interface on Electrical Properties.* J.L. Batstone, Julia M. Phillips and E.C. Hunke, AT&T Bell Laboratories, Murray Hill, NJ, and Memphis State University. High resolution electron microscopy has been used to determine the atomic structure at the epitaxial CaF<sub>2</sub>/Si(III) interface before and after a rapid thermal anneal. Direct Ca-Si bonding at the interface, with 8-fold coordinated Ca atoms is observed in as-grown layers. Fluorine is preferentially removed from the interface during a rapid thermal anneal leaving 5-fold coordinated Ca atoms. A dramatic improvement in the electrical properties of the interface is observed after annealing. The measured interface state density is reduced from  $\geq 10^{13}$ cm<sup>-2</sup> to  $\leq 10^{11}$ cm<sup>-2</sup>. This has been correlated with the removal of F from the interface. No evidence for direct F-Si bonding is observed.

*Simplified Thawing of Platelets Frozen in the Presence of PGI<sub>2</sub>.* Kevin R. Coffey, Christian Brothers College. The function of blood platelets after long-term storage has been studied. Our new single-step protocol calls for a total thawing time of only twenty minutes. The platelets have post-thaw morphology scores (score=260) which are not significantly different than the pre-freeze morphology scores (score=269). Comparing the platelet count and percent aggregation of the platelets thawed by our new method and other acceptable methods has proven significant. That is, there is no significant difference in the platelet count and

percent aggregation in the platelets thawed by our new quicker technique and the "old" stepwise technique which employed the thawing protocol of Dayian and Pert. *In vivo* testing of platelets thawed by our new protocol has not yet been performed.

*Group VIB Metal Carbonyl Derivatives of 2-( $\beta$ -Diphenylphosphinoethyl) Pyridine.* Mary P. Cook and Larry W. Houk, Memphis State University. 2-( $\beta$ -diphenylphosphinoethyl) pyridine (NP) is an interesting "mixed ligand" which should have properties intermediate to those of 2,2'-bi-pyridyl (bipy) and 1,2-bis diphenylphosphinoethane (diphos), since its structure is a hybrid of the latter two. Several Cr, Mo, and W carbonyl complexes of the NP ligand have been prepared and these compounds are discussed and compared with the corresponding bipy and diphos complexes.

*Rates of Hepatic Cholesterol Biosynthesis in Non-Human Primates (or Rhesus).* Kirk A. Fee, Christian Brothers College. The enzyme HMG-CoA reductase has been shown to be the ratelimiting step in cholesterol biosynthesis. Increased synthesis of cholesterol and decreased bile acid synthesis can theoretically be factors behind an increased cellular cholesterol content. This increased cholesterol in the cells regulates the expression of LDL receptors by the liver, which in turn, correlates inversely with the levels of plasma cholesterol. Rhesus monkeys fed similar diets containing added cholesterol responded with either high levels or low levels of plasma cholesterol. The labels were determined by each monkey's position either above or below two standard deviations from the mean cholesterol levels of the group of monkeys. Assays for HMG-CoA reductase were performed on liver samples from the monkeys to see if increased cholesterol biosynthesis was ultimately behind the higher cholesterol levels. The enzyme alkaline phosphatase was used to dephosphorylate and thus maximally activate the HMG-CoA reductase in the assays. The reductase values were relatively the same for both the high-responding and the low-responding monkeys. These results led us to conclude that increased cholesterol biosynthesis is not the factor behind increased cellular cholesterol content, which determines LDL receptor expression and therefore the plasma cholesterol concentration. The results dictate assays to see if decreased bile acid production is ultimately behind the increased plasma cholesterol levels.

*Quantum Hall Effect and Helicon Damping in a Semi-Conductor Superlattice.* J. R. Ferguson and B.N. Narahari Achar, Memphis State University. We have studied numerically the damping of helicon waves in a GaAs/(AlGa)As superlattice as a function of the applied magnetic field on the basis of linear response theory applied to a Kronig-Penney model. We find plateaus in the damping in excellent agreement with the plateaus in the Hall resistivity corresponding

to the quantum Hall effect.

*Large Interneurons Containing Parvalbumin and Gamma-Amino Butyric Acid are Found in the Rat Neostriatum.* R. Gadowski, R. Cowan, C.J. Wilson and P.C. Emson, Christian Brothers College. Neurons containing parvalbumin, calcium binding protein (CaBP) and gamma-amino butyric acid (GABA) were immunocytochemically identified in serial semi-thin sections of the rat neostriatum. Colocalization of parvalbumin and GABA was studied using adjacent sections stained with anti-parvalbumin and anti-GABA. The distribution of parvalbumin over the CaBP patch and matrix compartments of the neostriatum was also examined. Parvalbumin was found to colocalize with a class of large, strongly GABA positive neostriatal interneurons. It did not colocalize with the GABAergic neostriatal projection neurons. The parvalbumin neurons were distributed equally over the CaBP patch and matrix compartments. This suggests that the influence of parvalbumin in the neostriatum is global rather than specific to certain areas of connectivity. These findings suggest that these interneurons may have rapid firing, low accommodation properties in analogy to parvalbumin-positive neurons in other areas of the brain.

*A Spectroscopic Study on X-Irradiated Semi-Methemoglobin.* Amy B. Jenkins and Richard L. Petersen, Memphis State University. Hemoglobin exhibits selective oxidation of the  $\beta$  hemes when two equivalents of cupric ions are added. The two  $\alpha$  subunits remain oxygenated. This semi-methemoglobin has been characterized by its visible spectrum and electron spin resonance spectroscopy (ESR). X-irradiation of oxyhemoglobin and semi-methemoglobin at 77 K has been followed with ESR spectroscopy. Electron capture during irradiation of oxyhemoglobin gives rise to two resolvable paramagnetic centers in the low spin ferric derivative region of the ESR spectrum. These have been assigned to the methemoglobin, the ESR predominately shows the  $\beta$  paramagnetic center while the  $\alpha$  center remains unchanged. Electron capture may also occur at the bound copper (II) on the  $\beta$ -chain and at the iron (III) in the oxidized  $\beta$ -chain.

*Complement Mediated Damage to Bacteria by Channel Catfish, *Ictalurus Punctatus*, Plasma.* Jill A. Jenkins and Donald D. Ourth, Memphis State University. The alternative complement pathway (ACP) provides the non-immune channel catfish with protection against many Gram-negative bacteria. The role of human plasma complement against Gram-negative bacteria is death of cells by insertion of the membrane attack complex (MAC), or terminal proteins of the complement cascade, into the cell envelope. We exposed *Escherichia coli*, *Pseudomonas fluorescens* and *Aeromonas salmonicida* to different catfish plasma treatments and then observed bactericidal activity and ultrastructural damage by scanning and transmission electron microscopy (SEM and

TEM). A percent bactericidal assay determined that catfish plasma was 99% bactericidal against 24 h cultures of *P. fluorescens* and *E. coli* and 10% bactericidal against *A. salmonicida*. Complement-induced cell damage was observed by TEM and SEM. This study shows that the ACP of channel catfish, which does not require antibody to function, provides an immediate defense mechanism against Gram-negative bacterial infections.

*The Effects of UV Light on the Nitrogen-Fixing Azotobacter Vinelandii*. Sharon Kallaher and T. Y. Wong, Memphis State University. *Azotobacter vinelandii* is a pleomorphic saprophyte that occurs in soil and water. This organism fixes nitrogen under aerobic conditions because the nitrogenase is highly sensitive to oxygen. In order to protect the nitrogenase, this organism has a very high respiratory rate, which eliminates oxygen rapidly at the cell surface, leaving the interior anaerobic. However, this high respiratory rate imposes a threat because more free radicals are produced that can kill the cell. *A. vinelandii* must have an effective protection mechanism against free radicals. This mechanism may also repair other toxic effects, such as cellular damage by UV light. The results indicate that *A. vinelandii* is much more resistant to UV light than *E. coli*. *A. vinelandii* has a delayed repair mechanism that is unobserved in *E. coli*.

*Lewis Structures of Inorganic Acids*. Arthur Lee and Ying-Sing Li, Memphis State University. Discrepancies in Lewis structures of some inorganic acids were found in different general chemistry textbooks. We would like to use the concept of resonance and to suggest a more favorable Lewis structure for each of these acids based on the experimental and spectroscopic information.

*Microwave Spectra of Bicyclo(3,3,1)Nonan-9-One*. San Li and Ying-Sing Li, Memphis State University. The Microwave Spectrum of Bicyclo(3,3,1)Nonan-9-one has been investigated. A-type transitions in the ground and the excited states have been assigned. The ground state rotational constants were determined to be A=1509, B=1493, and C=1372.2 MHz. These results suggested that the molecule exists predominately in the CC form. The infrared spectra of the molecule will all be discussed.

*Conformational Study of 2,2,2-Trichloroethyl Methyl Ether*. Grata Liu and Ying-Sing Li. The low-resolution microwave spectrum of 2,2,2-trichloroethyl methyl ether has been recorded in the region of 26.5 to 39.0 GHz. Two major series of bands were observed. From the spacings in each series, the values of 1996 and 2065 MHz for B+C are obtained for the trans and gauche conformers, respectively. Additionally, several of the less intense transitions are assigned as due to other isotope species for the trans and gauche conformers. The vibrational spectrum has also been recorded in various phases, solvents and temperatures.

Vibrational assignments will be presented and discussed.

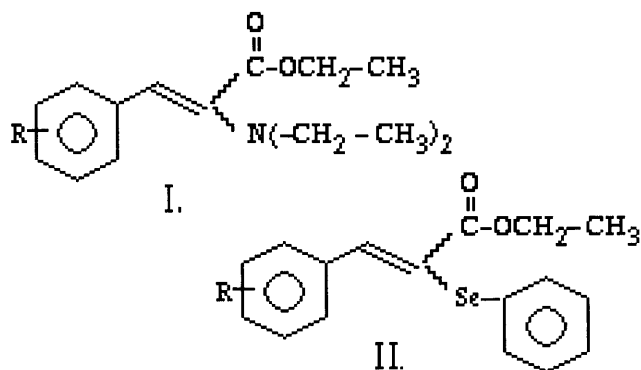
*Angiotensin II-Induced Polyphosphoinositide Breakdown in Cultured Bovine Glomerulosa Cells*. Lisa C. Mosher and Robert E. Kramer, Christian Brothers College and The University of Tennessee, Memphis. Angiotensin II-induced changes in inositol phosphate concentration were studied in cultured bovine adrenal glomerulosa cells prelabeled with <sup>3</sup>H-inositol. The conventional Dowex resin anion exchange chromatography procedure was used as well as a more recent high performance liquid chromatography method. The latter method was used when the former method failed to provide any valuable results. However, a new set of problems arose with this method, thus impeding progress of the study. Although the HPLC method that was developed was useful in other concurrent studies by Kramer, it was determined that further study would be necessary to fulfill the objective of this experiment: to observe angiotensin II-induced changes in intracellular inositol triphosphate concentration and to correlate these changes with those of intracellular Ca<sup>2+</sup> in cultured bovine adrenal glomerulosa cells.

*Nondiscrimination by Squirrels for Insect Infested and Viable Acorns: Implications for Seed Survival*. Kirsten E. Nicholson, Memphis State University. Possible discrimination by free-ranging gray squirrels (*Sciurus carolinensis*) for insect damaged (infested) and fully developed, noninfested (viable) *Quercus nigra* acorns was tested. Known infested and viable acorns were assessed with an x-ray procedure and feeding trials (which included 20 infested and 20 viable acorns) were conducted on the Memphis State campus from 23 December 1987 to 17 January 1988. From ten feeding trials it was determined that squirrels could not distinguish the two categories of acorns. Therefore, infested acorns have the same chance of being consumed and dispersed as viable acorns. This data is not in accordance with the hypothesis that only viable acorns will be dispersed.

*Effect of Light Intensity on the Foraging Habits of Raccoons (Procyon Lotor) in Northwest Mississippi*. Daniel Morgan Poole, Christian Brothers College. Nocturnal activity and foraging habits of raccoons were studied by sampling the existing population in Northwest Mississippi with hounds. Raccoons were shown to be more active on dark nights than on brighter ones.

*The Styrene Probe Applied to <sup>15</sup>N and <sup>77</sup>Se NMR. I. Ethyl  $\alpha$ -Diethyl Aminocinnamates (I) and Ethyl  $\alpha$ -Phenylselenocinnamates (II)*. Alan A. Shaffer and Charles N. Robinson, Memphis State University. Previous work had shown that the <sup>19</sup>F NMR chemical shift/Hammett substituent constant correlation of Ethyl  $\alpha$ -fluorocinnamates gave a positive slope, opposite to that predicted by the  $\pi$ -polarization mechanism. To ascertain if this was a general phenomenon in  $\alpha$ -substituted cinnamate esters for atoms having unshared

pairs of electrons,  $^{15}\text{N}$  chemical shift correlations were obtained for the  $\underline{Z}$ - and the  $\underline{E}$ - isomers of ethyl  $\alpha$ -diethylaminocinnamates (I). A positive slope was found for both isomers, with the  $\sigma$ -scale giving the best single substituent parameter result.  $^{77}\text{Se}$  NMR of the two isomers of Ethyl  $\alpha$ -(phenylseleno)cinnamates (II) revealed that, in this case also, a positive slope was obtained, although there was a large disparity in both the slopes and the coefficients ( $R^2$ ). The implications of these findings will be discussed.

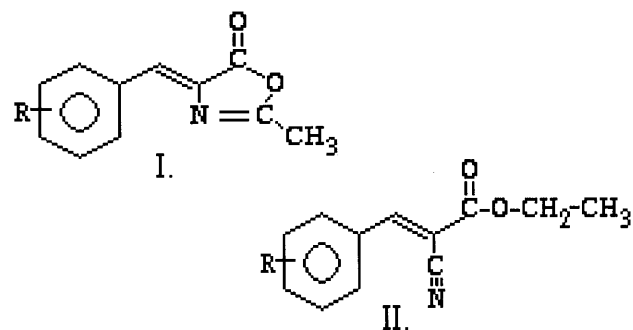


*Antagonistic Effect of Calcium on Mannose Inhibited Sucrose-Supported Growth of *Azotobacter Vinelandii*.* Mohammad Reza Shouri and T.Y. Wong, Memphis State University. Mannose is not a suitable sugar to support the growth of *Azotobacter vinelandii*. However, when mannose was added to culture medium containing sucrose, it inhibited cell growth on sucrose. Kinetic analysis showed that mannose inhibited sucrose transport non-competitively. Additionally, when calcium was added to the medium containing sucrose and mannose, the inhibitory effect of mannose was reduced. Subsequent data indicated that calcium stimulated sucrose transport into the cell.

*Food Habits of the Nine-Banded Armadillo (*Dasypus Novemcinctus*) in Southwestern Arkansas.* Robert S. Sikes, Mary P. Chambers, Memphis State University and Gary A. Heidt, University of Arkansas at Little Rock. Food habits of the nine-banded armadillo (*Dasypus novemcinctus*) were examined in Little River County, Arkansas. Eighty-four armadillos (52 males, 32 females) were collected from October 1986 through January 1988. All specimens examined were actively foraging when taken. Stomach contents were analyzed for food items present, percent occurrence, and percent volume. Food items observed were primarily invertebrates (earthworms, beetle larvae, fly larvae) but vertebrates (young mice, frogs, salamanders, skinks) and plant material were present in some individuals.

*The Styrene Probe Applied to  $^{15}\text{N}$  NMR. II. Benzylidene Azlactones (I) and Ethyl  $\lambda$ -Cyanocinnamates (II).* Marius J. Toldi, Alan A. Shaffer and Charles N. Robinson, Memphis

State University. The  $^{15}\text{N}$  chemical shift correlation study described in the previous paper was extended to a series of benzylideneazlactones (I) and ethyl  $\alpha$ -cyanocinnamates (II) with  $\text{sp}^2$  and  $\text{sp}$  hybridized nitrogens, respectively. In both series, the nitrogen's unshared electron pairs are rigidly held orthogonally to the  $\pi$ -electrons in the styryl system, preventing the through-resonance phenomenon observed in the ethyl  $\alpha$ -diethylaminocinnamates. The  $\pi$ -polarization mechanism predicts a negative  $^{15}\text{N}$   $\delta$  correlation slope for series I and a positive slope for series II. In both cases, these predicted slopes were observed; however, the correlation for series II was far superior (with  $\sigma^{13}$ ,  $R^2=0.990$ ) to that of series I (with  $\sigma$ ,  $R^2=0.801$ ). The most likely explanation for this difference is that the phenyl ring anisotropy may be affecting the spatially proximate unshared electron pair in series I.



*Chemotactic Response in *Azotobacter Vinelandii*.* Anna R. Williams and T.Y. Wong, Memphis State University. Bacterial chemotaxis is stimulated by chemical attractants or repellents. These compounds are recognized by receptors bound to the bacterial membrane or in the periplasmic space. Migration of the bacteria to or from these compounds is made possible by the flagella. We wish to demonstrate the chemotactic behavior in *Azotobacter vinelandii* under different nutrient environments. To illustrate the effect of chemotactins *A. vinelandii* was grown in a particular sugar. Cells were added to agarose columns containing different sugars. Over a period of three hours at thirty minute intervals, the migration bands of the cells in these columns were recorded. We observed that the chemotactic response was inducible. When cells were grown in the sucrose, the cell readily migrated into the sucrose column but no movement was observed in the fructose column. Other sugars were also tested similarly. Detailed results will be discussed.